Lab No. 4: Implementation of a Client-Server Model

Lab Objectives

- Define the two-tier client/server architecture and its different types.
- Understand the communication mode in a three-tier architecture.
- Access the web application server and execute client requests.
- Access the mail server and implement a mini chat between clients.

Lab Approach

This lab aims to explore the client/server architecture and the three-tier architecture through two main parts:

- Theoretical part, which includes the definitions of fundamental concepts.
- Practical part, which demonstrates the functioning of these architectures within the local network of the network lab.

I. Theoretical Part

I.1 Client/Server Architecture

The client/server architecture defines a communication model between multiple computers, called clients, within a network. These clients send requests or demands to be processed by a designated server. A server can be specialized as an application server, file server, terminal server, or even an email server.
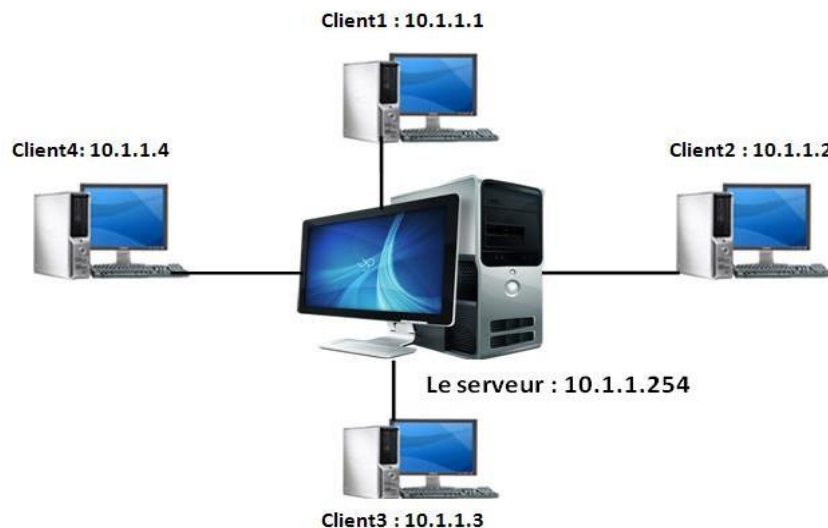
Figure 1: Client/Server Architecture

I.2 Three-Tier Architecture

The three-tier architecture (or three-layer architecture) is a logical software architecture model designed to separate an application into three distinct layers: the presentation layer, the logic layer, and the data access layer.

The key components that enable the implementation of a three-tier architecture system are:

- The web server

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Prepared by: MA RIAHLA

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- The database server

- The client workstation

The client sends requests to the application server through a web browser. The server processes these requests by interacting with the database server to retrieve the necessary data and respond to the client's request.

Figure 2: Three-Tier Architecture Model

I.3 Different Types of Servers and Their Characteristics

1. **File Server**
   Manages file storage and access. It requires a high-performance disk system (controller and disks), at least 512 MB of RAM, and a highly efficient network card.

2. **Application Server**
   Hosts applications that network users can access. All software processing occurs on the server, making processor speed and RAM capacity (at least 64 MB) crucial.

3. **Print Server**
   Manages print requests. This type of server is often combined with a file server or an application server, as it does not require a highly powerful system.

I.4 Applications

I.4.1 Definition of Web Applications
A web application is a software program that runs on a server and is accessed by users through a web browser. The application can be executed locally within an intranet network or remotely via the Internet.

In this lab, we will use the following applications:

A. University Library Management Application
This web application manages the entire collection of books based on their details and specifications (classification code, author, publisher, categories, etc.). Its purpose is to facilitate the librarian's work while reducing the time required for students, learners, and researchers to find documents.

B. Company Vehicle Fleet Management Application
This web application ensures real-time tracking of vehicle reservations and availability within a company. It helps allocate vehicles to employees based on the company's needs.

C. Instant Messaging (Chat) Application
Installed on a server, this instant messaging application enables real-time communication between two users within the network. It provides a text-based dialogue system for seamless interaction.

D. Enterprise Portal Application
An enterprise portal is an intranet platform that provides access to company data and IT system resources

through a unified interface. It serves as the central entry point for employees and, potentially, business partners, aiming to streamline access to the organization's information system.

II. Practical Part

II.1 Machine Configuration

1. The applications installed on the server for this lab are:

   o University Library Management Web Application

   o Company Vehicle Fleet Management Web Application

   o Instant Messaging (Chat) Application

   o Enterprise Portal Application

2. The server has the IP address **1.1.1.254**. A server software is installed on this machine, allowing each application to run.

3. All other machines act as client workstations.

II.2 Accessing the Applications

To access the applications hosted on the server:

- Open a web browser on a client workstation.

- Enter the server's address **1.1.1.254** in the URL bar.

- A server interface will appear, displaying links to the four applications.

II.2.1 University Library Management Application

1. Reader Access

- On the server interface, click the **"Gestion_bibliothèque"** link.

- A search engine will appear, allowing users to find books using various criteria.

- Select the desired search criteria and click **"Search"** to retrieve results.

2. Administrator Access

1. Enter the URL: **http://10.1.1.254/Gestion_bibliothèque/administrateur/**

2. On the login interface, enter:

   o **Username:** admin

   o **Password:** 1111

3. Use the left-side menu to manage library tasks, such as book loans, book entries, author and publisher management, and category organization.

4. Click **"Logout"** to exit the administrator interface.

II.2.2 Company Vehicle Fleet Management Application

- This application is accessible only to administrators.

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- Click on the **"Gestion parc de véhicule"** link on the server interface.

- Log in using the same **admin credentials** as the library application.

- The application menu allows real-time management of company vehicles.

II.2.3 Instant Messaging (Chat) Application

- Click on the **"messagerie_infotronique"** link to access the instant messaging service.

- Before using the chat, each student must **register** to create a personal **login and password**.

- Once registered, students can log in and chat with other users connected to the server.